cirad

IRD

DynaGeV

Dynamique des Génomes Végétaux

Workshop on Plant Genome Dynamics and Evolution

CIRAD Campus de LAVALETTE - MONTPELLIER

Le 8 et 9 Juin 2017

GenomeHarvest
diversity, organization and dynamics

agropolis fondation

INVESTISSEMENTS D'AVENIR

Evolution of the banana genome is impacted by large chromosomal translocations

Guillaume Martin[1], Françoise Carreel[1], Olivier Coriton[2], Catherine Hervouet[1], Céline Cardi[1], Paco Derouault[1], Danièle Roques[3], Frédéric Salmon[4], Mathieu Rouard[5], Julie Sardos[5], Karine Labadie[6], Franc-Christophe Baurens[1], Angélique D'Hont[1]

[1]. *CIRAD, UMR AGAP, F-34398 Montpellier, France*

[2]. *Institut National de la Recherche Agronomique, Unité Mixte de Recherche 118, Amélioration des Plantes et Biotechnologies Végétales, BP 35327, F-35653 Le Rheu cedex, France*

[3]. *CIRAD, UMR AGAP, F-97130 Capesterre Belle Eau, Guadeloupe, France*

[4]. *CIRAD, UMR AGAP, F-97170 Petit-Bourg, Guadeloupe, France*

[5]. *Bioversity International, Parc Scientifique Agropolis II, 34397 Montpellier Cedex 5, France*

[6]. *Commissariat à l'Energie Atomique (CEA), Institut de Genomique (IG), Genoscope, 2 rue Gaston Cremieux, BP5706, 91057 Evry, France*

guillaume.martin@cirad.fr

Most banana cultivars are triploid derived from *Musa acuminata* (2n=2x=22), sometimes combined with *Musa balbisiana* (2n=2x=22). These species and subspecies diverged following geographical isolation in distinct Southeast Asian continental regions and islands. Contact between them was made possible by human migration and led to the selection of seedless parthenocarpic hybrids. *M. acuminata* subspecies were suggested to differ by a few large chromosomal rearrangements based on chromosome pairing configurations in inter-subspecies hybrids. We searched for large chromosomal rearrangements in a seedy *M. acuminata* ssp. *malaccensis* banana accession through mate-pair sequencing, BAC-FISH, targeted PCR and marker (DArTseq) segregation in its progeny. We identified a heterozygous reciprocal translocation involving two distal 3 Mb and 10 Mb segments from chromosomes 01 and 04, respectively, and showed that it locally generated high segregation distortions and reduced recombinations in its progeny. The two chromosome structures were found to be mutually exclusive in gametes and the rearranged structure was preferentially transmitted to the progeny. The rearranged chromosome structure was frequently found in triploid cultivars but within the wild accessions, it was only found within *malaccensis* sub-species accessions, thus suggesting that this rearrangement occurred in this sub-species. We propose mechanisms for the spread of this rearrangement in *Musa* diversity and propose that this structure may have played a role in the emergence of triploid cultivars.